Jack Pine

Forest Service
U. S. DEPARTMENT OF AGRICULTURE

JACK PINE

(*Pinus banksiana*)

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Jack pine is a short-lived, small- to medium-sized northern tree that is able to grow in extremely cold climates and on very poor soils. The great bulk of it is located in Canada. Jack pine grows naturally in the United States only in the southern extremities of its range where it extends down into the Lake States and to a limited extent into New England. The tree serves a distinct purpose in forming stands of timber on cut-over and burned-over areas where the soil has become so impoverished that other more valuable species with which the areas were originally forested can no longer exist. These jack pine stands enrich the soil and in time again make possible the growth of other species, such as eastern white pine and red pine. On such sites the more valuable species gradually crowd out the jack pine. On other and poorer sites known as "jack pine plains" the tree grows in mixture with scrub oak. Building up the soil on such sites so it will support more desirable species is a long process and may never be brought about. The wood is used principally for paper pulp, especially for high-grade wrapping and fiberboard. The limbs on jack pine trees persist for a long time after they die, and the lumber is commonly knotty and of low grade. It is used for boxing and crating and rough construction.

Nomenclature.—Jack pine is the generally accepted common name for this species. Other names sometimes used are scrub pine, gray pine, and black pine.

Distribution and growth.—In the United States jack pine grows naturally in the Lake States and in a few scattered areas in New England and New York [1] (fig. 1). It is a tree of cold climates although wide variations of temperature take place within its range. The commercial stands, including both saw timber and pulpwood, are limited to certain parts of the Lake States and are located largely in northern Minnesota. The stands of jack pine in the United States represent the southern limits of growth of the species which occurs throughout much greater areas and in much greater quantities in Canada, where its range extends in a wide band from Nova Scotia in a northwesterly direction nearly to the foothills of the Canadian Rocky Mountains.

Jack pine occurs in mixture with other species and also in pure stands. It requires an abundance of direct sunlight for satisfactory growth—more than either of its frequent associates, red pine and eastern white pine. Mixed stands of jack pine and other more desirable species are generally the result of fires which follow logging operations in eastern white pine and red pine stands. These fires

[1] Jack pine has been extensively and successfully planted in the sand hills of western Nebraska.

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impoverish the soil to such an extent that only jack pine can grow in it. The resultant jack pine stands gradually build up an accumulation of decomposed vegetable matter on the ground and this ultimately brings about enough soil improvement to support the original species which require less sunlight than jack pine and in time largely replace it.

FIGURE 1.—Range of jack pine (*Pinus banksiana*) in the United States.

A large proportion of jack pine stands grow on "jack pine plains" where the soil is thin, dry, bare, and sandy and incapable of supporting other tree growth except scrub oak. Conversion of the stands on such areas to other species through soil improvement is a slow process at best.

Jack pine grows best on fairly deep, moist soil with good drainage but is usually crowded out of such locations by species requiring less sunlight. The trees in mature stands in northern Minnesota where

these favorable conditions obtain are usually 60 to 75 feet in height, 9 to 15 inches in diameter, and 80 to 100 years old. On less favorable locations such as the "jack pine plains" the trees are smaller. Some cones are produced every year and heavy crops every 2 or 3 years. Many of the cones persist on the tree for several years before they become dried sufficiently by wind and sun to open and distribute their seed. The winged seed are readily carried by the wind for considerable distances. The cones that fall to the ground frequently do not open and release their seed until subjected to fire. Reproduction is most plentiful on bare soil in the open.

Fire is the greatest enemy of jack pine stands—especially of young stands, which it may entirely destroy. Fire is also the principal means by which the species perpetuates itself; fires on areas which have been logged for red pine and eastern white pine frequently bring about conditions that result in stands of jack pine. When jack pine trees reach an age of 60 years or more, they become increasingly subject to heart rot caused by fungus attack.

Supply.—The stand of jack pine of saw-timber size in the United States was placed at 2,678,000,000 board feet in 1938. This figure is based on the results of a forest survey conducted in the Lake States,[2] where practically all of the commercial jack pine is located,[3] and is made up as follows:

State:	*Board feet*
Wisconsin	246, 000, 000
Minnesota	2, 263, 000, 000
Michigan	169, 000, 000

In addition to materials of saw-timber size the forest survey showed a stand of high-grade jack pine pulpwood of approximately 8 million cords of which over 5 million cords was in Minnesota.

Production of lumber.—In the statistics of lumber production of the Bureau of the Census the term "white pine" includes the lumber cut from eastern white pine, red pine, and jack pine. The average annual production of "white pine" lumber in the Lake States for the 10-year period 1934–43 was 145 million board feet. If it is considered that the lumber production of the three species that make up this total is proportional to their stand in the Lake States, then the average annual cut of jack pine lumber in recent years would be about 46 million board feet.

Pulpwood.—The annual consumption of jack pine pulpwood (nearly all domestic) [4] for the past 20 years has ranged from a minimum of approximately 40,000 cords in 1920 to a maximum of approximately 415,000 cords in 1940. The average annual consumption for the 10-year period 1931–40 was 256,000 cords, equivalent roughly to 100 million board feet,[5] or over twice as much as the estimated lumber production. Estimates indicate that the consumption of jack pine for pulpwood in 1943 and 1944 was 288,943 and 511,638 cords, respectively.

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[2] See CUNNINGHAM, R. N., and MASON, H. C. FOREST AREAS AND TIMBER VOLUMES IN THE LAKE STATES. Lake States Forest Expt. Sta. Econ. Note 10, 10 pp. 1938. [Processed.]

[3] The stands of jack pine in New York and New England are considered negligible.

[4] In the pulpwood statistics of the Bureau of the Census domestic and imported jack pine pulpwood are not separated except in 1940. In that year approximately 13 percent of the 480,000 cords consumed was imported. In other years the consumption figure is occasionally accompanied by a note stating that a small proportion of imported material is included.

[5] In the Lake States a cord of jack pine pulpwood is considered equivalent to 400 board feet.

The average annual cut of jack pine for all purposes, including an allowance for fuel, railroad ties, etc., is estimated at the equivalent of 175 million board feet.

Properties.—The sapwood of jack pine is nearly white and the heartwood light brown to pale orange. In trees under 50 years of age the trunk is largely sapwood. Even in trees 100 years old sapwood makes up about one-half the volume. The wood is moderately light in weight,[6] moderately weak in bending strength and in compressive strength, lacking in stiffness, moderately soft, and moderately low in shock resistance. It is rather coarse in texture, somewhat resinous, intermediate in workability with tools, and has a moderately small shrinkage. When nailed, it is more liable to split than red pine but is only slightly below red pine in nail-holding power. The lumber is generally knotty and has a tendency to warp and check during the drying process unless considerable care is used. It is considered much less desirable than lumber cut from eastern white pine or red pine. The small percentage of high-grade jack pine lumber that is produced resembles red pine and is generally marketed as such. The heartwood of jack pine is rated as intermediate in durability when exposed to conditions favorable to decay.[7] It is moderately difficult to penetrate with a preservative. In paint-holding ability jack pine ranks below eastern white pine.

Jack pine is suitable for the manufacture of paper pulp by several of the commercial pulping processes.[8] It reduces readily by the sulfite process to produce a pulp of good color and strength but shivey and pitchy. This pulp is suitable for wrapping paper and low-grade printing papers. The sulfate process yields a very strong pulp of fine texture suitable for high-grade wrapping papers and fiberboard. The wood can also be easily pulped by the soda process. By the mechanical process it reduces fairly readily but requires about 50 percent more power at the grinders than white spruce, one of the woods commonly used for ground wood. The usefulness of this pulp is limited by poor color and the presence of pitch.

Principal uses.—Jack pine is used principally for pulpwood, box lumber, and fuel. Less important uses include railway ties, mine timbers, slack cooperage, and posts.

The wood is pulped largely by the sulfate process and to a limited extent by the ground-wood process. Jack pine sulfate pulp is used in the manufacture of strong wrapping paper and fiberboard. The ground-wood pulp is used in mixture with stronger chemical pulps in the manufacture of cheap printing papers.[9]

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[6] The average weight of jack pine in a thoroughly air-dry condition (12 percent moisture) is 30 pounds per cubic foot.

[7] The sapwood of all species lacks durability.

[8] Six processes are used commercially in making paper pulp from wood. One is the mechanical or ground-wood process, in which the wood is reduced to pulp on a grindstone. Four processes, the sulfite, sulfate, soda, and neutral sulfite, depend upon the dissolving action of chemical reagents which remove essentially all of the binding material (lignin) surrounding the cellulose fibers and leave them in a fairly pure state. The removal of the lignin is accomplished by cooking the wood chips with the proper chemical under steam pressure. In a sixth process, the semichemical, part of the lignin is removed by chemical means, and the pulping action is completed by mechanical refining.

[9] The proportion of jack pine ground-wood pulp that can be used in such a mixture is limited by the pitch content of the ground wood.

Jack pine lumber goes largely into shipping containers (boxes and crates) and rough local construction. The wood is much used for fuel in many parts of its range. Jack pine railway ties frequently are treated with a wood preservative, such as creosote, in order to increase their life in service.

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